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COTS-Based Software Systems

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Preface

It is with great pleasure that I introduce the Proceedings from the 2nd International Conference on COTS-Based Software Systems (ICCBSS). The theme for ICCBSS 2003 is “Multiple Paths – Multiple Solutions,” representing the fact that developers of commercial off-the-shelf (COTS)-based systems choose from a set of potentially competing products the best interacting suite for a particular context. It is a task that is becoming more familiar, but no less challenging, with each new system under development. The possible solutions often differ from each other in ways that are difficult to assess, but, in the end, one of those solutions will be implemented.

By combining good research with the practical application by knowledgeable developers and systems integrators of those research results, we are beginning to develop roadmaps that will help ensure success. We believe that ICCBSS 2003 was a major step forward, providing attendees and all those who read this volume with the means to interact and network. As with the previous conference, the attendees represented a worldwide network of like-minded people, who are committed to the principles of COTS-based systems. We had submissions from all major continents, with attendees representing academia, business, government, and industry. This bodes well for the future of the field and for this conference series.

These proceedings are proof that there is a dynamic community of software researchers and practitioners who are expanding the scope of their interest in developing systems using COTS software products, whether standalone applications or commercial components. The papers presented here were written by both old friends and new acquaintances and represent the best of a significant number of submissions. We regret that we could not choose more papers for presentation in the conference program but we know that the Program Committee reviewed critically and chose wisely.

Last year’s conference was a success in many ways, not the least of which was the interaction of the attendees. A number of new collaborations were started and new friendships begun. ICCBSS 2003 in Ottawa, Canada offered a unique opportunity to celebrate our accomplishments and to cement these relationships. The conference organizers, the European Software Institute, the National Research Council Canada, the Software Engineering Institute, and the University of Southern California Center for Software Engineering, welcomed the chance to showcase this work from many outstanding researchers, developers, and integrators in this ongoing forum. We look forward to many years of successful conferences.



International
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The European Software Institute (ESI) has now established itself as one of the world's major centers for software process improvement. Our strength lies in our close partnership with industry. ESI's business-driven approach focuses on issues that result in a genuine commercial impact, such as reduction of costs and improving productivity.

ESI's work is divided into four key technology areas: Software Process Improvement, Measurement, System Engineering, and Product-Line-Based Reuse, where COTS Research is allocated.

Learn more about the ESI at <http://www.esi.es>.



National Research Council Canada

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Learn more about the NRC at <http://www.nrc.ca>.



Software Engineering Institute

The Software Engineering Institute (SEI) provides leadership in advancing the state of software engineering practice. We collaborate with industry, academia, and the government to learn about the best technical and management practices and then use what we learn to benefit the software engineering community.

The institute is based at Carnegie Mellon University and is sponsored by the US Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics [OUSD (AT&L)].

Learn more about the SEI at <http://www.sei.cmu.edu>.



USC Center for Software Engineering and CeBASEC-CSE

The USC Center for Software Engineering (USC-CSE) focuses its research and teaching efforts toward helping industry and government address multiple new challenges of concern to software system procurers, developers, and users. We work in partnership with the members of our Affiliates Program, which includes some two dozen organizations representing a mix of commercial industry, aerospace, government, nonprofit FFRDCs, and consortia. The Center for Software Engineering is based at the University of Southern California.

Learn more about USC-CSE at <http://sunset.usc.edu>.

Tutorials

Evaluating COTS Using Function Fit Analysis

Presenter: Steven Woodward (Q/P Management Group of Canada)

Today many organizations are attempting to reduce software development effort and schedules by purchasing off-the-shelf solutions rather than developing them from scratch. This strategy can be very cost effective if the COTS solution meets the customer requirements. Unfortunately, in numerous situations, the extent to which COTS solutions satisfy requirements is not quantified. This can result in overall higher-priced COTS solutions or the selection of COTS when “make” is actually a more cost-effective alternative.

Conducting complete and accurate quantified assessments of the “COTS fit” and not relying on vendor claims of high compatibility can improve the probability of successful COTS selection and project completion. This tutorial will provide attendees with practical examples on Function Point Analysis, plus “Functional Fit Analysis” techniques that have proven to be successful for the US DoD and in large projects in identifying the compatibility of COTS products with customer requirements. The technique called “Function Fit Analysis” is based on function point analysis (FPA). Function point analysis is the decomposition of an existing or planned system based on the customer perspective of functional requirements. Function points therefore can be used to evaluate various COTS solutions, select the best solution, and determine the degree of enhancement work required to meet customer requirements.

This session provided attendees with specific details of the process, including a Function Point Analysis overview, plus practical examples and cases utilizing the Function Fit Analysis process. The following topics were addressed in this session.

- The Function Fit Analysis Process
 - Function point analysis of requirements
 - Rules of FPA
 - Examples/cases of applying FPA rules
- Evaluation and Quantification of COTS
 - Function gap analysis
 - Calculating COTS fit
 - COTS project estimation
 - The make/buy/punt decision
- Leveraging the Information in Various Scenarios

Function Fit Analysis has been successfully used by the US Navy and a number of government agencies in the US and Canada to evaluate and select specific COTS solutions. The attendees gained practical knowledge of how to make the process operational for use on their own projects in order to ensure successful implementation of COTS projects.

MSG/ESS ITSEP

Presenters: Gail Brown (MSG/ESS); Billie Common (MSG/ESS, BTAS);
Todd Trickler (MSG/ESS, BTAS); David Bentley (MSG/ES, SCRA)

The Integrating Technology by a Structured Evolutionary Process (ITSEP) is a powerful and straightforward approach to selecting, fielding, and supporting Commercial-Off-The-Shelf (COTS) and other reuse solutions in complex environments. ITSEP provides a framework to develop, field, and support a solution composed of an integrated assembly of hardware and software products, the required custom code, linkage to enterprise architecture, and end-user business process changes. ITSEP uses concurrent discovery and negotiation of four spheres of activity that influence the solution. These spheres comprise: user needs and business processes, industry and the marketplace (including commercial and government), engineering and design, and programmatic constraints (including risk management). The Materiel Systems Group (MSG) has used ITSEP to develop solutions for several projects such as the Air Force Technical Order (TO) Concept of Operations, TO Transformation, Aircraft Battle Damage Assessment and Repair (ABDAR), Depot-X planning, Manufacturing Resource Planning II (MRP II)/Maintenance, Repair & Overhaul (MRO), and MSG Business Development.

The tutorial incorporated MSG's experience to date using ITSEP and provided attendees with practical knowledge useful in developing and supporting COTS-based solutions. The tutorial consisted of a four-part presentation that taught the basics of ITSEP and related MSG's experience with the process. Part one of the tutorial covered an overview of ITSEP. Part two covered the practical application of ITSEP through a review of MSG projects. Part three covered: more on practical application, this time focusing on marketplace evaluations; what the MSG has learned, both good and bad; and the mistakes made and the changes incorporated to avoid mistakes in the future. Part four continued with practical application of the process. This final part of the tutorial addressed the infrastructure support that needs to be developed and functioning before gaining the full strength and benefit of the ITSEP process.

Trouble spots, worthwhile efforts, and practical lessons learned were presented throughout the tutorial. We hope that customers or users, program and project managers, developers, commercial vendors, and anyone considering and/or involved with putting together a COTS-based solution benefited from this tutorial. Since this conference was a forum to exchange ideas and results, discussion was strongly encouraged as a component of the tutorial.

Marketing Principles for COTS Developers and Acquirers

Presenters: Eileen Forrester and Suzanne Garcia (Software Engineering Institute)

One of the challenges inherent in the development of COTS-based systems is that marketing communications surrounding components is not effective at help-

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ing practitioners to make appropriate matches between available components and system needs. Basic marketing principles and practices could improve the rate of effective matches. In this tutorial, attendees learned marketing ideas and techniques that will make them better at communicating the attributes of components that make for better fits. Deployers of COTS-based systems can also use these principles and techniques to further the appropriate adoption of systems.

Poster Sessions

Title: **“Competitive Development of Solutions Based on COTS Technology”**

Presenters’ Names: Vladimir Lilov (Rila Solutions, Bulgaria) and Sylvia Ilieva (Sofia University, Bulgaria)

Title: **“Fast Multi-team Development Using COTS Components – A Case Study”**

Presenter’s Name: Pedro Falcão Gonçalves (iBest S/A, Brazil)

Title: **“Meta-Model Based Component-Level Interaction Analysis”**

Presenters’ Names: Fan Ye and Tim Kelly (University of York, UK)

Title: **“Composable Process Elements for Developing COTS Based Applications”**

Presenters’ Names: Jesal Bhuta, Barry Boehm, and Daniel Port (Center for Software Engineering, University of Southern California)

Title: **“Evolutionary Process for Integrating COTS-Based Systems (EPIC)”**

Presenter’s Name: Cecilia Albert and Lisa Brownsword (Software Engineering Institute)

Title: **“COTS Evaluation & Selection Process Based on DESMET and AHP Methodologies”**

Presenter’s Name: David Morera (European Software Institute, Spain)

Title: **“Software Acquisition Model for New Component-Based Software Systems”**

Presenter’s Name: David Morera (European Software Institute, Spain)

Experience Report

Title: **“Tools for Successful COTS Software Implementation and Integration”**

Author: Gail M. Talbott (Program Director, Lockheed Martin Asset Solution Integration)

Government and commercial industries are relying more and more on the successful integration of Commercial-Off-The-Shelf (COTS) software to reduce systems development and maintenance costs and keep pace with technological advances. The use of COTS software in systems development introduces the need for a unique software engineering approach and expertise. COTS products integration combined with expertise in the research, analysis, and selection of technologies for a particular market is essential to the successful implementation of COTS-based systems. The presentation outlined the Lockheed Martin (LM) Asset Solution Integration (ASI) Service’s practical experience as a solution integrator in the Enterprise Asset Management (EAM) domain, and explored valuable lessons learned when faced with the challenge of successfully architecting, implementing, and delivering COTS-based systems. It combined a Business Model, which defines the methodology used for COTS solution integration, and the Defined Software Engineering Process that identifies the approach to the successful delivery of integrated COTS solutions.

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